TECHNICAL BRIEF

EPA and Army Developing a Protocol for Detecting Biological Agents in Drinking Water

Background

EPA's National Homeland Security Research Center (NHSRC), Water Infrastructure Protection Division (WIPD), headquartered in Cincinnati, Ohio, is responsible for conducting research to protect drinking water systems and sources from terrorist attacks. As part of this responsibility, the NHSRC, in partnership with the Department of the Army, is developing a protocol for the detection of biological contaminants that would present a health threat if used in an attack against the nation's water supplies.

Analytical Methods and Protocol Development Program

The objective of this program is to develop a robust, comprehensive, and fully validated protocol, including procedures for the collection, concentration, preparation, and simultaneous analysis of multiple biological contaminants in water. Analytical methods for the detection of biological agents in environmental water samples exist for several contaminants that have been associated with outbreaks of illness from water. Most of these methods are assays for single contaminants or groups of closely related contaminants. Some of the contaminants that might be of concern during a terrorist attack have no associated methods for detection in water samples. If methods for these contaminants exist at all, they have been adapted from clinical (i.e., medical) methods and have not been tested for effectiveness when applied to environmental samples. Environmental samples differ significantly from clinical samples with respect to the concentration* of microbes in the sample and the potential for interference from naturally occurring microbes. The concentration of microbes in an environmental sample is typically far less than that found in clinical samples. Also, environmental samples may contain more and different types of naturally occurring bacteria than do clinical samples. This makes the problem of distinguishing between harmful bacteria and normally occurring bacteria more difficult in environmental samples. This program focuses on overcoming these challenges.

*** NHSRC has published on its Web site at http://www.epa.gov/nhsrc/news/news030905.htm a related technical brief addressing the problem of concentrating microbes in environmental water samples to aid detection.**

The NHSRC is developing the protocol in partnership with the Department of the Army's Edgewood Chemical Biological Center and with the support of a steering committee composed of experts in the fields of microbiology and analytical chemistry. Once the protocol has been developed and tested in a single-laboratory format, EPA's Office of Water, Water Security Division (WSD), will direct the testing of it in a multiple-laboratory format.

The purpose of analytical method development is to provide presumptive methods for detecting unknown biological contaminants, including bacterial spores, vegetative bacteria, viruses, and protozoa, in water. The protocol will include molecular assays, cell culture assays, and rapid field

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assays, although performance criteria, rather than specific assays, will be specified for rapid field methods. The protocol will be made widely available to laboratories interested in rapid detection of microbes with the intent that in the event of a presumptive positive result, samples will be referred to laboratories with more sophisticated diagnostic abilities for confirmation and further testing. The initial protocol will consist of validated methods for approximately 20 organisms. Additional method development and testing is anticipated in the coming years to supplement the initial protocol.

Users and Benefactors of the Analytical Methods

Expected users of the protocol include drinking water utilities, wastewater utilities, emergency responders, contract samplers, and environmental and public health laboratories.

For more information, visit the NHSRC Web site at www.epa.gov/nhsrc.

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